

CLAIMS

What is claimed is:

1. A heat sink device used for ball grid array package with
5 modified embedded heat slug, said heat sink device used for said ball
grid array package with said modified embedded heat slug comprises:
a first part of heat sink assembly, said first part of heat sink
assembly having a first heat dissipating element and a second heat
dissipating element on said first heat dissipating element;
10 a printed circuit board having a flip chip package thereon; and
a second part of heat sink assembly, said second part of heat sink
assembly having a protruding part in the central of said second part of
heat sink assembly and at least two opening on the two sides of said
second part of heat sink assembly, wherein said first part of heat sink
15 assembly is above said flip chip package of said printed circuit board,
and said second part of heat sink assembly is below said flip chip
package of the printed circuit board.
2. The heat sink device used for said ball grid array package with
20 said modified embedded heat slug according to Claim 1, wherein said
first heat dissipating element is made by casting.
3. The heat sink device used for said ball grid array package with
said modified embedded heat slug according to Claim 1, wherein said

second dissipating element is a heat-dissipating fin.

4. The heat sink device used for said ball grid array package with said modified embedded heat slug according to Claim 1, wherein a
5 conductive protruding block on the backside of said first heat dissipating element.

5. The heat sink device used for said ball grid array package with said modified embedded heat slug according to Claim 1, wherein a
10 thermal conductive adhesive tape on the backside of said first heat dissipating element.

6. The heat sink device used for said ball grid array package with said modified embedded heat slug according to Claim 1, wherein said
15 ball grid array package comprises an embedded heat slug with a cavity therein.

7. The heat sink device used for said ball grid array package with said modified embedded heat slug according to Claim 1, further
20 comprising a conductive material between said first heat dissipating element and said ball grid array package and to adhere said first heat dissipating element and said ball grid array package.

8. The heat sink device used for said ball grid array package with

said modified embedded heat slug according to Claim 1, wherein said at least said two conductive pillars below said first heat dissipating element.

5 9. The heat sink device used for said ball grid array package with said modified embedded heat slug according to Claim 1, further comprises at least two springs put around at least said two conductive pillars.

10 10. A heat sink device used for said ball grid array package with said modified embedded heat slug, said heat sink device for ball grid array package with modified embedded heat slug comprises:

 a heat sink assembly, said heat sink assembly having a thermal conductive adhesive tape, on the backside of a first heat dissipating
15 element, and a second heat dissipating element on said first heat dissipating element;

 a printed circuit board having said flip chip package thereon, wherein said flip chip package having a cavity of embedded heat slug therein; and

20 a conductive protruding block, said conductive protruding block embedded said cavity of said ball grid array package, wherein said first heat dissipating element on said ball grid array package of said printed circuit board, and said conductive protruding block within said cavity of said embedded heat slug contact with said backside of said first heat

dissipating element.

11. The heat sink device used for said ball grid array package with
said modified embedded heat slug according to Claim 10, wherein said
5 first heat dissipating element is made by casting.

12. The heat sink device used for said ball grid array package with
said modified embedded heat slug according to Claim 10, wherein said
second heat dissipating element is a heat-dissipating fin.

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13. The heat sink device used for said ball grid array package with
said modified embedded heat slug according to Claim 10, further
comprising a conductive material between said first heat dissipating
element and said ball grid array package.

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14. The heat sink device used for said ball grid array package with
said modified embedded heat slug according to Claim 10, further
comprising a second heat sink assembly below said ball grid array
package of said printed circuit board.

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15. The heat sink device used for said ball grid array package with
said modified embedded heat slug according to Claim 14, wherein said
second heat sink assembly having a protruding part in the central and
at least two openings on the two sides of said second heat sink

assembly.

16. A heat sink device of ball grid array package, said heat sink device of said ball grid array package comprises:

5 a first heat sink assembly, said first heat sink assembly having a shaping-unity first heat sink element with a conductive protruding block, a second heat dissipating element on said first heat dissipating element, and at least two conductive pillars is below said first heat dissipating element;

10 a printed circuit board having a ball grid array package thereon, wherein said printed circuit board having at least two holes thereon; and

15 a second heat sink assembly, said second heat sink assembly having a protruding part in the central and at least two openings on the two sides of said second heat sink assembly, wherein said first heat sink assembly used at least said two conductive pillars that passed through at least said two holes of said printed circuit board, and joined with said openings on said two sides of said second heat sink assembly.

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17. The heat sink device of said ball grid array package according to Claim 16, wherein said first heat dissipating element having said conductive protruding block is made by casting.

18. The heat sink device of said ball grid array package according to Claim 16, wherein said second heat dissipating element is a heat-dissipating fin.

5 19. The heat sink device of said ball grid array package according to Claim 16, further comprising a conductive material filled with at least said two holes of said printed circuit board, thereby at least said two holes connected with said at least said two conductive pillars.

10 20. The heat sink device of said ball grid array package according to Claim 16, further comprising at least two springs put around at least said two conductive pillars.